ILLINOIS WATERWAY, BRANDON ROAD LOCK AND DAM
1100 Brandon Road
Joliet vicinity
Will
Illinois

HAER IL-164-G
IL-164-G

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

ILLINOIS WATERWAY, BRANDON ROAD LOCK AND DAM

HAER No. IL-164-G

Location:	1100 Brandon Road, Joliet vicinity, Will County, Illinois, on Des Plaines River Latitude: 41.5107936, Latitude: -88.0919175
Present Owner:	U.S. Army Corps of Engineers, Rock Island District
Present Use:	Navigation of the Illinois Waterway
Significance:	The Brandon Road Lock and Dam Historic District is significant as a component of the Illinois Waterway, which was developed to provide a navigable route from Lake Michigan to the Mississippi River and beyond. The electric hoists used to operate the dam's Tainter gates are unique on the waterway.
Historian:	Justine Christianson, HAER Historian, 2008
Project Information:	The Illinois Waterway Recording Project (2007-2008) is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Heritage Documentation Programs, a division of the National Park Service, U.S. Department of the Interior, Richard O'Connor, Manager. The U.S. Army Corps of Engineers (USACE) funded the project. Ron Deiss, USACE, and Dana Lockett, HAER Architect, served as project managers. Dana Lockett and Anne Kidd produced the measured drawings. Large format photography was done by Brian Grogan. Justine Christianson wrote the historical reports. Research assistance was provided by John Fitzgerald, Archivist, USACE.

Part I. Historical Information

A. Physical History:

1. **Date of Construction:** (1927-33)
The lock was constructed from 1927-33, while the dam and ice protection wall were completed a year earlier. The permanent control station was not completed until 1935.[1]

2. **Architect/Engineer:**
Walter Mickle Smith of the State of Illinois designed the lock, dam and ice protection wall under the supervision of L.D. Cornish, Assistant Chief Engineer. The State of Illinois is credited with the control station design.[2]

3. **Builder/Contractor/Supplier:**
E.J. Biggs Construction Company built the control station.[3]

Independent Bridge Company of Pittsburgh, Pennsylvania manufactured, installed and tested the lock gates and valve operating machinery.[4]

Connolly Construction Company completed the masonry work at the site.[5]

4. **Original Plans:**
In a 1930 publication entitled "The Illinois Waterway," the U.S. Army Corps of Engineers detailed the plans for the site. At the northern end of the site where the Illinois & Michigan Canal (I&M Canal) paralleled the new waterway, a junction lock measuring 22' x 100' with wood gates and a 9' life would be built. The junction lock would connect the Brandon Road pool with the nearby I&M Canal.

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[1] Mary Yeater Rathburn, American Resources Group Ltd., "Architectural and Engineering Resources of the Illinois Waterway between 130th Street in Chicago and La Grange," Volume 2, prepared for U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL, October 1996, p. 117-122 and 127-128. The inventory completed by American Resources Group, Ltd., dates the control station to the same era as the lock, but the U.S. Army Corps of Engineers *Annual Report* from 1935 states the control house was completed that year (see U.S. Army Corps of Engineers, *Annual Report of the Chief of Engineers, U.S. Army* (Washington, DC: Government Printing Office, 1935), pages 948-949).

[2] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 117-122, 127-128; Mary Yeater Rathburn, American Resources Group Ltd., "Architectural and Engineering Resources of the Illinois Waterway between 130th Street in Chicago and La Grange, Illinois," Volume 1, prepared for the U.S. Army Corps of Engineers, Rock Island District, Rock Island, Illinois, October 1996, p. 76.

[3] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 119-120.

[4] Folder 821.1 (Dresden Island Lock and Dam) W-1088-Eng-249, Lock Gates Etc., 1931-32 in Army Corps of Engineers, Chicago District, Record Group 77, National Archives and Records Administration, Great Lakes-Chicago (hereafter cited as RG 77, NARA, Chicago).

[5] Walter B. Anthony, Civil Engineer to District Engineer, Chicago, IL, Subject: Brief History of Construction of Brandon Road Lock and Dam, October 28, 1932, in Folder 285/68b (Ill Wwy) State of Illinois 1932-49, File #5 in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

The wall and embankment separating the canal from the Des Plaines River would be removed.[6]

An earth and gravel-filled dam with a concrete core wall would be located between the junction lock and the main lock serving the Illinois Waterway, as described in "The Illinois Waterway." The publication described the dam as having both upstream and downstream slopes "with selected rock riprap section extending 3 feet above and 9 feet below normal pool level." The spillway portion of the dam would contain a 30' ice chute and sluice gates that could discharge 12,000 cubic feet of water. These sluice gates were incorporated into the design at the request of "the city of Joliet, in order to obtain additional assurance that the retaining walls throughout the city would never be overtopped during flood periods." The dam also had twenty-one Tainter gates measuring 50' wide with 3" thick piers at the crest.[7] The Army Corps planned to generate power at the site, so the western section of the dam was reserved for that purpose. A guide wall extending from the end of the lock met the ice protection wall, and together the two walls formed the enclosed triangular forebay. An earth dam and the "power-house" section of the dam, comprised of sixteen 15' x 20' sliding gates, served as the bottom boundary of the forebay.[8]

Finally, according to the Army Corps publication, the main lock featured a guardwall extending 600' from the upper end of the river wall. The chamber would measure 110' x 600' with a 31' lift and a 15' depth over sills. Steel miter gates would be located at each end of the chamber, with an additional steel guard gate located above the upper miter gates.[9]

5. **Alterations and Additions:**
In 1967, Army Corps had the lock walls resurfaced. Two years later, new valve operating machinery had to be installed.[10]

A number of alterations were made at the site in the 1980s. In 1980, eight of the headgates were concreted in place, the ice chute was converted to overflow use, and the sluice gates were concreted into a partially open position. In 1984, the lock gates were rehabilitated, and the lock walls resurfaced again. The following year, the Army Corps had the guidewalls resurfaced, and the electrical system and lock gate operating machinery replaced. Finally, in 1986, the Tainter gate operating machinery was replaced.[11]

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[6] U.S. Army Corps of Engineers, "The Illinois Waterway," (Washington, DC: U.S. Government Printing Office, 1930), p. 45.
[7] Army Corps, "The Illinois Waterway," p. 46.
[8] Army Corps, "The Illinois Waterway," p. 46.
[9] Army Corps, "The Illinois Waterway," p. 46.
[10] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 117.
[11] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 117-121; Barbara J. Henning, "Brandon Road Lock and Dam Historic District," National Register of Historic Places Nomination Form, Section 7, Pages 3-4.

In 1995, the Army Corps undertook a major rehabilitation on the waterway, shutting down the system for sixty days so lock walls could resurfaced and gates repaired or replaced as necessary.[12]

B. Historical Context:

The work at Brandon Road Lock and Dam consisted of three projects, the first of which was the construction of retaining walls for that portion of Brandon Road pool that ran through the center of Joliet. The second project involved the alteration of the bridges spanning the waterway in Joliet. Finally, the lock and dam had to be built. Another component of the work was the construction of a guard lock on the Illinois & Michigan Canal (I&M Canal), which paralleled the Illinois Waterway in the vicinity of Brandon Road lock and dam. Dating to 1848, the I&M Canal was an early solution to the problem of inland water navigation in this region but proved too small to effectively promote shipping. Instead, the canal became a means for Chicago to move its sewage out of the city. By the 1933 opening of the Illinois Waterway, the I&M Canal had become obsolete. In order to keep traffic on the Illinois Waterway from straying into the abandoned I&M Canal, a guard lock was built just north of the Brandon Road Lock.[13]

Miscommunication between the state and the Joliet city council delayed the start of construction at Brandon Road. The state's Department of Purchase and Construction (headed by the governor's son, the *Chicago Daily Tribune* was eager to point out) neglected to send the official letter to the city council asking for approval of the project, so when the council convened to approve the state's plans, they were forced to adjourn without reaching a decision.[14] Once approval had been granted, construction could finally begin in the fall of 1927. The state decided to do the work itself to save money at the recommendation of William F. Mulvihill, supervisor of waterway construction, even though contracts had already been let.[15]

Walter Mickle Smith of the State of Illinois designed the site. The dam design was similar to that at Starved Rock with an ice protection wall located next to the dam's ice chute. Headgates were installed at the west end of the dam in anticipation of a water power plant being built on the site, which never actually happened.[16]

In October 1928, the *Chicago Daily Tribune* reported that an inspection tour of the waterway revealed the excavation of the main lock chamber and side walls was almost

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[12] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 105 and Volume 2, p. 117.
[13] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 76.
[14] "Small Delays Joliet's O.K. on Waterway Link," *Chicago Daily Tribune*, September 9, 1925, p. 15.
[15] "State Will Be Own Contractor on Canal Lock," *Chicago Daily Tribune*, October 28, 1927, p. 18.
[16] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 76.

complete.[17] The U.S. Army Corps discovered after assuming authority over the waterway in 1930 that approximately 60 percent of the work at the site had been finished by the state. In 1931, the Army Corps hired Connolly Contracting Company of St. Paul to finish the masonry work and the Independent Bridge Company of Pittsburgh to complete the lock gates and valve operating machinery.[18] In the spring of that year, the cofferdam erected for the construction of the lock was blasted open, allowing "the swift waters of the swollen Des Plaines River to swirl into the new channel for Chicago-New Orleans barge traffic."[19]

The Brandon Road pool extended upstream from Brandon Road Lock and Dam to the Chicago Sanitary Canal at Lockport for a total distance of 4 miles. Its path ran through the center of Joliet, complicating the construction of this section of the waterway since engineers had to figure out how to prevent flooding of the city during high water periods. The solution was to construct concrete retaining walls to channel the pool through the city of Joliet. (See Appendix A, Figure 9) The east wall ranged from 40' to 15' high and extended 2-1/3 miles. The west wall measured 23' high and 1.8 miles long. In addition, those bridges spanning the pool with inadequate clearances had to be altered to accommodate barge traffic on the waterway. To guard against flooding out the city of Joliet during high water periods, the dam was equipped with six gates "of such size that the engineers estimate the pool could be drained to normal levels within three hours."[20]

Various auxiliary buildings have been erected and alterations made to the operating machinery during the site's operational history.

Part II. Structural/Design Information

A. General Description:[21]

The Brandon Road Lock and Dam site consists of the main lock, dam, control station, and junction lock with the Illinois & Michigan Canal, along with guide walls and an ice protection wall. The district also contains a number of auxiliary structures that were added throughout the site's operational history, including a pump house, control

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[17] "70 Chicagoans Inspect Locks in Illinois River," *Chicago Daily Tribune*, October 5, 1928, p. 3.
[18] Connolly Contracting Company had the low bid of $415,350. "Announces Low Bids on Seaway Masonry Work," *Chicago Daily Tribune*, February 3, 1931, p. 4; U.S. Army Corps of Engineers, *Annual Report of the Chief of Engineers, U.S. Army* (Washington, DC: Government Printing Office, 1931), p. 1275 (hereafter cited as USACE, *Annual Report*, date of publication).
[19] "Blast Seaway Dam as Rains Swell Streams," *Chicago Daily Tribune*, May 20, 1931, p. 1.
[20] Arthur Evans, "Open Waterway by March 1 or Bust! Is Slogan," *Chicago Daily Tribune*, January 22, 1933, p. 11; Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 76.
[21] Building descriptions are based on field work conducted by the HAER recording team in 2007-2008 and the inventory completed by Mary Yeater Rathburn and the American Resources Group, Ltd., "Architectural and Engineering Resources of the Illinois Waterway," Volume II, pp. 117-184.

stands, hoists, storage buildings, tow haulage units, operating machinery, scooter building, workshops, and mooring piers.[22]

At the north end of the site is a junction lock on the Illinois & Michigan Canal that is now inoperable. The lock chamber measures 22' x 92'. The miter gates on the upstream end are fixed while those at the downstream end have been removed.[23] The junction lock and main lock are connected by a fixed earthen embankment.

The Ohio River Standard Navigation main lock with a 34' lift extends across the Des Plaines River. The lock chamber measures 110' x 600' and has reinforced concrete walls. The lock has steel miter gates at both its upstream and downstream ends that are operated by electric motor assemblies. The chamber is watered by ten rectangular ports measuring 5' x 3'-6" that are located along the bottom of each lock wall. The ports extend from a 12' diameter culvert that runs through the interior of the chamber walls. The difference in size between the openings and the culvert diameter was planned in accordance with the Venturi principle, which states that the pressure of water is increased by movement through a constricted opening. Four valves operated by hydraulic machinery regulate the flow of water through the culverts. The riverward chamber wall has guide wall extensions at the upstream and downstream ends to help barge traffic maneuver in and out of the lock.[24]

Centered on the landward side of the lock chamber is the 962 square foot control station that served as the "administrative and operational hub" of the lock. The control station is a one story, cross gabled brick building with concrete detailing and four belt courses. Metal industrial sash windows provide the crew with views of the lock chamber and waterway. It is identical to those at Lockport, Dresden Island, Marseilles and Starved Rock.[25]

A number of other structures related to the operation of the lock are located in the vicinity of the control station. To the west of the control station is the scooter building. Dating to the 1980s, the one story metal building with a low arched roof houses the electric scooters used by the lock crew for transportation around the site.[26] An emergency generator building was erected to the west of the scooter building in

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[22] The lock, dam, junction lock, and control station have been determined contributing structures, as has the Brandon Road Bridge, a drawbridge positioned 200' downstream. The pump house and other minor buildings like the control stands, emergency generator building, and elements like the mooring piers have been determined noncontributing, see Barbara J. Henning, "Brandon Road Lock and Dam Historic District," National Register of Historic Places Nomination Form, 2001, Section 7, Page 1.

[23] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 129-130; Henning, "Brandon Road Lock and Dam Historic District," Section 7, Page 3.

[24] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 117-118; Henning, "Brandon Road Lock and Dam Historic District," Section 7, Page 1.

[25] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 119; Henning, "Brandon Road Lock and Dam Historic District," Section 7, Pages 2-3.

[26] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 165-166.

1986. The 160 square foot, one room, one story fiberglass building is similar to generator buildings at Lockport, Dresden Island, Starved Rock and Marseilles.[27]

Various structures related to the lock's operation have been added throughout the site's operational history. A fire equipment well, dating to 1965, is located in a pit covered by a metal gable roof in the esplanade at the upstream end of the lock's landwall. The well is identical to those at Starved Rock and Marseilles.[28] The construction of five weather-proof power cabinets, which are located at each corner of the lock chamber and the dam, was another 1960s modification. The cabinets contain the controls, fuses, circuit breakers and other components necessary to power sections of the lock and dam. They were built to replace the original cabinets dating to 1933 and are similar to those at Lockport, Dresden Island, Marseilles, and Starved Rock.[29] In 1969, the original machinery operating the valves located within the lock chamber's walls was replaced by hydraulic machinery. Originally, the valve operating machinery had been housed in wells sunk within the lock walls, but the new hydraulic machinery was instead housed in three metal cases located at the upstream and downstream ends of the lock's land wall and the downstream end of the river wall. Identical machinery was installed Lockport, Dresden Island, Marseilles, and Starved Rock. [30]

Work at the site in the 1970s included installing two identical trash racks made up of motorized winch and derrick assemblies. Located on each side of the lock, the assemblies lower roller rakes with hooks attached into the water in front of the lock gates and penstocks. The rakes help pick up debris in the water that could potentially clog the gates and openings.[31] Replacement tow haulage units were installed in the 1970s. The three motorized winch assemblies, located at the upstream end of the lock's guide wall, the downstream end of the lock's land wall and the end of the downstream guide wall, "minimize the maneuvering that the towboat has to do, actually eliminating the need for it to lock through more than once. The tow haulage units pull the first cut into and out of the lock, so that the towboat can stay in its original position and lock through with the second cut." Identical units were installed at Lockport, Dresden Island, Marseilles, Starved Rock, Peoria and La Grange.[32] Finally, four control stands (also known as "dog houses") were built around 1976 at each corner of the lock chamber to house the switches operating the lock valves and gates. The 52 square foot, one room, one story metal buildings have large windows on all four walls to provide unobstructed views of the lock chamber.[33]

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[27] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 163-164.
[28] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 143-144.
[29] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 145-146.
[30] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 149-150.
[31] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 167-168.
[32] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 100 and Volume 2, pp. 147-148.
[33] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 153-160.

In 1980, thirteen cylindrical reinforced concrete piers with mooring bits embedded in them were installed extending from the river's bottom to above the surface of the pool. Two at the downstream end of the lock measure nearly 30' and 20' in diameter, while eleven are located at the upstream end. One of those measures 30' in diameter while the rest are 20'. The piers help keep boats from running into the river wall of the lock and give crews a place to tie their boats while waiting to be locked through. Similar ones were built at other sites along the Illinois Waterway, as well as the Upper Mississippi lock and dam sites.[34] Five years later, the lock gate operating machinery, originally housed in pits in the lock walls, was replaced with four identical motor assemblies that were located on top of the lock walls at each corner of the lock chamber. Identical machinery was installed at Lockport, Dresden Island, Marseilles and Starved Rock.[35]

Between the dam and lock is a strip of land on which a number of utilitarian buildings are located, including a 240 square, one room metal storage shop dating to 1977.[36] A 720 square foot, one room, one story metal building next to the storage building serves as a workshop and dates to 1984.[37] Another building dating to 1977 is the adjacent 160 square foot, one room, metal oil/paint shed.[38]

The main dam and lock are connected by an earthen dam. The 500' ice protection wall links the upstream guidewall extension of the lock to the dam at the junction of the headgate and ice chute and creates a triangular enclosed forebay. It is the only one in the waterway system where there is no adjacent power plant.[39] The 320' long concrete pier dam at the western end of the dam is also a remnant of the original design, which called for a power house to generate power for sale. The pier dam contains sixteen 16' x 15' single-leaf, vertical lift headgates. Eight of the sixteen headgates have been concreted in the closed position. Next is the dam storage building, a 192 square foot, one room, one story metal building with metal industrial sash windows that dates to 1987. The ice protection wall joins the dam at the eastern end of the head gate section. To the east of this junction is the 30' concrete ice chute, since converted to overflow use. Next is a 91' concrete pier dam with six 7' x 8' sluice gates, which have been concreted in a partially open position. Finally, there is an 1,100' concrete pier dam with twenty-one 2'-3.5" x 50' Tainter gates.[40]

Three stationary electric hoists mounted on the easternmost headgates of the dam operate the dam's Tainter gates. The 1930s-era hoists are the only ones of their kind on the Illinois Waterway and the Upper Mississippi River 9' Navigation project and

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[34] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 177-178.
[35] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 151-152.
[36] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 169-170.
[37] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 173-174.
[38] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 171-172.
[39] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 127.
[40] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 121-122; 175-176.

"as such, they are a rare intact example of a type of engineering technology."[41] Another unique element is the movable hoist for the headgates. In operation in 1933, the mobile electric hoist car moves on a rail system and opens and shuts the five single-leaf vertical lift headgates of the dam.[42] The stationary and movable hoists are

> necessary here because the Brandon Road facility is charged with maintaining the proper water level for the upper pool between Joliet and Lockport. When word comes from the Chicago Sanitary District that high levels of water are headed downstream, the Brandon Road dam must be able to release water quickly to maintain the proper water level. The hoists allow this rapid water release to take place.[43]

The Brandon Road Lock and Dam site is accessed by a loop drive extending from Brandon Road. To the north of the drive loop is the 1973 maintenance shop/pump house located in the vicinity of the original lockkeepers' houses, which were removed in 1991. This 6,000 square foot, one room, one story metal building has a low pitched gable roof. Metal industrial sash windows punctuate the south facade. The lock and dam site is at a higher elevation than the drive, parking lot, and maintenance building and is accessed by a stairway from the parking lot.[44]

B. Construction:

The State of Illinois built the lock walls, upper approach and ice protection walls, the head and sluice gate sections, the east and west core walls, I&M Canal junction lock, and a small portion of the dam before transferring the waterway to the federal government in 1930. The Army Corps had oversight of the waterway and awarded contracts to complete the work as well as made modifications to the original design.

The contract for the masonry work was let to the Connolly Construction Company, who finished the excavation of the lock walls and lower approach; constructed the various concrete sections of the east and west core walls and the head and sluice gate sections; repaired three cracked piers; built the overflow dam section and lower approach sections as well as the earth embankments that connected the main lock with the I&M Canal junction lock and the head gate sections; backfilled behind the lock and lower approach walls; and top soiled the slopes. The Independent Bridge Company won the contract for metal work at both Brandon Road and Dresden Island.

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[41] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 123-124; Henning, "Brandon Road Lock and Dam Historic District," Section 7, Page 2.
[42] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 125-126.
[43] Henning, "Brandon Road Lock and Dam Historic District," Section 7, Page 2.
[44] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 179-180. In addition to the maintenance building, a group of buildings is located in this vicinity that used to serve as the Illinois Waterway Joliet Project Office but is now used by Army Reserve. These include the Army Reserve Center off Highway 6, two storage buildings, a maintenance building, a boat house on the Des Plaines River, and a radio tower. See Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 135-141 and 181-183.

The company was also responsible for building, installing and testing the miter gate and lock valve machinery.[45] The contract stated the scope of work:

> fabricating and erecting of … one (1) lower lock miter gate of two (2) leaves complete with anchorages and all fittings necessary for its complete installation, six (6) pairs of head gates, twenty one (21) Taintor gates, twenty one (21) Tainter gate operating bridges, one (1) ice chute bridge, six (6) flood sluice gates, and the electrical wiring system at Brandon Road Lock and Dam.[46]

The Army Corps not only completed construction but also made some modifications to the original design. Since the original plans called for a power house, the headgates were fixed. Due to the potential for high waters that could flood Joliet, the Corps needed to be able to quickly lower the pool. The design was therefore changed to movable headgates. Colonel Weeks, District Engineer, noted that "by replacing the present fixed gates which are located at the head gate structure by movable gates, the pool can be rapidly drawn to that above the CRI & PRR bridge, the river would be at practically the same elevation as it was before the construction of the Brandon Road dam, provided all of the 16 headgates and the six sluice gates were open." The Army Corps settled on "a double gate of the wagon body type with eight cast steel wheels on each gate. The wheels are designed with as large diameter as possible to decrease the unit stress in the bearing angle under the wheel." Hyatt roller bearings helped reduce the friction.[47]

By 1932, the Army Corps could report the masonry and metal work had been finished, the operating machinery had been installed, and a temporary control house and eight machinery shelters constructed. Construction of the walls for Brandon Road pool through Joliet was also underway.[48] (See Appendix A, Figures 1-8)

From 1932 to 1933, the Army Corps undertook a "Winter Program" using some Public Works funds in which alterations and repairs were made to the waterway's locks prior to the opening of the waterway. The Corps had the lock unwatered, accomplished by building a poiree dam at the lower gates and closing the upper gates. The lower sills

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[45] Walter B. Anthony, Civil Engineer, to District Engineer, Chicago, IL, Subject: Brief History of Construction of Brandon Road Lock and Dam, October 28, 1932, in Folder 285/68b (Ill Wwy) State of Illinois 1932-49, File #5, in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[46] Contract information in Folder 821.1 (Brandon Road L&D) W-1088-Eng-238, Metal Works, 1930-33, in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[47] Hyatt roller bearings had been used by the State of Illinois on submerged gates, see Dan I. Sultan, Lt. Col., Corps of Engineers, District Engineer to District Engineer, St Paul, Subject: Action of Hyatt Roller Bearings, March 26, 1932 in Folder 821.13 (Lock Gates and Machinery) 1932-41, in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago. See also W.C. Weeks, Col., Corps of Engineers, District Engineer to the Division Engineer, UMVD, St Louis, Missouri, Subject: Substitution of movable gates for fixed gates in the head gate structure at Brandon Road Lock & Dam, May 21, 1931, in Folder 821.1 (Brandon Road L&D) W-1088-Eng-238, Metal Works 1930-33, in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[48] USACE, *Annual Report*, 1932, p. 1178. T.A. Kvale of Joliet built the shelters, see Folder 821.1 (Brandon Road L&D) Machinery Shelters, W-1088-Eng-305, 1931-32, in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

were redesigned to accommodate a steel emergency dam with all steel support bents, castings, plates, bolts and reinforcing bars. Rubber seals were obtained for the operating gates, and Paschen Brothers Inc. cut eight valve stop-log recesses to be used in dewatering the gates when necessary.[49] There were issues with the state's design of the lower miter sills. The Army Corps found that the design did not provide "for possible upward water pressure between the rock and concrete" so the plans for Brandon Road were altered since construction had not yet begun.[50]

In 1935, the permanent control house at Brandon Road pool was completed, along with the standby power unit and stop log installation. The control house replaced a temporary steel one at the site that had been erected by T.A. Kvale.[51] The final major additions to the site occurred in 1939 with the building of the two lockkeepers' houses, each with a garage/storehouse, by the Biggs Construction Company of Chicago.[52] (See Appendix A, Figures 10-11)

There were mechanical difficulties that the Army Corps had to resolve not long after the waterway opened for use. The original plans had called for wrought iron hoisting cables for the lock's valves, but in 1934, those had been replaced by wire rope hosing and bridle cables. Only two years later, however, the culvert valve gates had failed at Lockport and Brandon Road, which the Army Corps suggested was probably due to the fact that the chains were not strong enough to withstand the pressure when the lock was being emptied. In May 1936, therefore, John Roebling Sons Company (who had supplied the wire rope) inspected all the valves and installed new cables.[53] In 1940, the Army Corps undertook a campaign to inspect and replace all valve gates at the locks after it had been discovered the valves at Brandon Road were again failing. Derrick boats were used to remove all the valves so they could be inspected and replaced if necessary.[54] In March 1941, the Army Corps studied the Brandon Road

[49] Folder 821.1 (Marseilles, Lockport, Brandon Road, Starved Rock), Stop Log Recesses, W-1088-Eng-591 1933-34; Dan I. Sultan, Lt. Col., Corps of Engineers, District Engineer to Area Engineer, U.S. Engineer Area Office, Joliet, IL, Subject: Winter Program for Lock Maintenance & Repairs, July 20, 1933, in Folder 821.13 (Lock Gates & Machinery) Unwatering 1932-33, both in U.S. Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[50] C.R. Andrew, Memorandum for the Files, Subject: Illinois Waterway—Some Items of Historical Interest Which are Buried in the Files, June 15, 1949, p. 5, in Folder 285/68b (Ill Wwy) State of Illinois 1932-49, File #5, in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago; USACE, *Annual Report*, 1934, pp. 857-858. The cost of the stop log recess installation was $16,528.88; the lighting cost $8,745.15; the fire protection/water distribution system amounted to $540.88. The winter program to repair the lock gates totaled $35,6435.16 and dredging was done at cost of $154,432.52.

[51] Folder 821.1 (Brandon Road Lock), Temporary Control House, W-1088-Eng-363, 1932-33, in U.S. Army Corps of Engineers, Chicago District, RG77, NARA, Chicago; USACE, *Annual Report,* 1935, pp. 948-949. The standby power unit cost $4,739.63 while the stop logs were $1,966.22. The permanent control house totaled $18,025.97.

[52] Folder 624 (Lockport & Dresden Is) W-1088-Eng-1229 (1939) in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[53] Folder 821.13 (Lock Gates & Machinery) Cables 1936-37 and Folder 821.13 (Lock Gates and Machinery) 1932-41 both in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[54] E.H. Beechley, Principal Engineer to The District Engineer, Chicago, Subject: Repairing valve gates, all locks, Joliet area, June 22, 1940, in Folder 821.13 (Lock Gates and Machinery) 1932-41 both in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

lock equipment because it had been discovered that the corrosion was far greater at Lockport and Brandon Road than at the lock and dam sites further downstream, which was probably causing the equipment failures. One suggestion for ameliorating the problem was to use USS-12 chrome along with a plain carbon material.[55]

C. Operation:

The waterway had been designed for use by "towboats pushing eight jumbo hopper barges." The jumbo barges each measured 35' x 195'. The configuration of the eight barge tow with a towboat consisted of two rows of three barges tied together followed by a row of two barges tied together. The towboat pushed the three rows into position in the lock chamber, then moved alongside the first row (made up of two barges) during the lockage. The resulting configuration measured 105' x 600', which allowed all the barges to be locked through in one pass since the lock chamber conformed to the Ohio River Standard size of 110' x 600'. By the 1950s, the fourteen barge tow had become the standard. While the Thomas J. O'Brien lock with its 110' x 1000' chamber could handle this larger tow configuration, the earlier locks could not. The fourteen barge tow measured 105' x 985', requiring that the tow be broken into two, known as "cuts," on the other locks. The first cut was made up of two rows of three barges tied together. The second cut followed the standard configuration used in the eight barge tow. Rathburn describes the locking through process with the fourteen barge tow configuration.

> After breaking the two into these two cuts, the towboat pushed the first cut of barges through the lock, locked through with it, pushed the cut out of the lock, locked back through to get the second cut of barges, pushed it into the lock, moved over into the 'third barge slot' in the last row of the eight-barge configuration, locked through with the second cut, and then reassembled the two cuts into one united configuration and moved back into its pushing position.[56]

This process was time consuming and caused congestion along the waterway, so the Army Corps installed replacement tow haulage units in the 1970s at all the locks except Thomas J. O'Brien. These units allowed the first cut to be pulled through the lock without the towboat, which remained in its position in the second cut. This minimized some of the time spent locking through. The installation of the new tow haulage units facilitated the use of the seventeen barge tow configuration, measuring 105' x 1118'. In this configuration, the first cut is made up of three rows of three barges. The second cut has two rows of three barges while the last row has two barges and an open slot for the towboat.[57]

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[55] War Department, United States Engineers Office, Culvert Valve Gates, Joliet Area, March 5, 1941, in Folder 821.13 (Lock Gates & Machinery) 1932-41, in U.S. Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[56] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 99.

[57] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, pp. 100-102.

From the 1930s to the 1970s, the amount and size of the vessels using the Illinois Waterway increased. In 1934, commercial traffic on the waterway amounted to 104,750, which had increased by 1953 to 20 million.[58] Traffic on the waterway leveled in the 1970s but congestion on both the Illinois Waterway and the Upper Mississippi River continues. According to a recently released study of the two systems dating to 2005, 51.6 million tons of commercial cargo worth $9.5 billion was transported on the Illinois Waterway. Together the two systems move 60 percent of corn exports and 45 percent of soybean exports, in addition to coal, chemicals and petroleum.[59]

The Brandon Road Lock and Dam remains a vital component of the Illinois Waterway. The Brandon Road Dam is significant for its use of electrical hoists to operate the Tainter gates and headgates, which is unique on the waterway.

Part III. Sources of Information

A. Primary Sources

"70 Chicagoans Inspect Locks in Illinois River." *Chicago Daily Tribune*, October 5, 1928, p. 3.

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[58] Department of Public Works & Buildings, "132 Years of Public Service: The History and Duties of the Division of Waterways," (State of Illinois, 1955), p. 15.
Illinois Waterway traffic statistics are provided in the U.S. Army Corps of Engineers' annual reports. The information is presented in various ways throughout the 1930s. In 1931, upbound traffic on the Illinois River (from La Salle to Grafton, IL) consisted of 128 steamers, 609 motor vessels, 21 sailing vessels, and 457 barges for a total of 1,215 vessels. The downbound traffic included 140 steamers, 515 motor vessels, 21 sailing vessels, and 400 barges for a total of 1,076 vessels. (USACE, *Annual Report*, Part II, 1932, p. 696.) By 1933 traffic had increased to a total of 2,140 upbound vessels at 341,760 tons, consisting of 50 steamers, 1,251 motor vessels, 772 barges, and 67 other types. Downbound traffic numbered 2,290 vessels at 344,249 tons, including 50 steamers, 1,282 motor vessels, 756 barges and 202 other types. In 1934 the total number of vessels had declined but tonnages increased, with upbound tonnage at 642,715 and downbound at 682,214. (USACE, *Annual Report*, Part II, 1934, p. 670 and Part II, 1935, p. 710.) In 1935, the statistics for the Illinois Waterway also included the Chicago Sanitary & Ship Canal and the Calumet-Sag Canal. The total tonnage was 1,361,280. On the South Branch of the Chicago River, 215,107 tons were carried. Total tonnage, including rafted traffic, was 1,584,428 tons worth $48,710,394. (USACE, *Annual Report*, Part II, 1936, p. 747.) In 1936, 1,537,759 tons were transported on the Illinois Waterway and 507,805 tons were moved on the South Branch of the Chicago River. The total tonnage was 2,048,057, including rafted traffic for a total value of $54,725,585. (Army Corps, *Annual Report*, Part II, 1937, p. 781.) In 1937, 2,874,864 tons were transported on the Illinois Waterway and 698,329 tons on the South Branch of the Chicago River. The total tonnage, plus rafted traffic, equaled 3,575,299 tons worth $65,604,398. (USACE, *Annual Report*, Part II, 1938, p. 803.) By 1938, the total tonnage on the Illinois Waterway (which included the Chicago Sanitary & Ship Canal, Calumet-Sag Canal, and South Branch of the Chicago River) was 4,446,493, including rafted traffic, at a total worth of $109,008,794. (USACE, *Annual Report*, Part II, 1939, p. 863.) From 1975-86, the amount of goods shipped on the waterway decreased from 48.5 million to 42.3 million. (Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 103.)

[59] See Final Draft "Re-Evaluation of the Recommended Plan: UMR-IWW System Navigation Study, Interim Report," Issued March 2008, available at http://www2.mvr.usace.army.mil/UMRS/NESP/ (accessed March 2009).

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"Small Delays Joliet's O.K. on Waterway Link." *Chicago Daily Tribune*, September 9, 1925, p. 15.

"State Will Be Own Contractor on Canal Lock." *Chicago Daily Tribune*, October 28, 1927, p. 18.

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C. Likely Sources Not Yet Investigated

Research was conducted in the Army Corps of Engineers records (Record Group 77) at the National Archives and Records Administration, Great Lakes Region, Chicago, but time constraints prevented thorough research into all available records. Additional information may be available in those records.

The State of Illinois' archives in Springfield, Illinois, contain the Annual Reports of the Division of Waterways, which could provide additional information on the state's construction activities. This archive was consulted by the American Resources Group with Mary Yeater Rathburn as Principal Investigator for the "Architectural and Engineering Resources of the Illinois Waterway between 130th Street in Chicago and La Grange" publication.

Appendix A: Images

Figure 1: U.S. Engineer Office, First Chicago District, Brandon Road Lock and Dam, Showing Lock Construction, May 5, 1931. Available at Brandon Road Lock and Dam, unlabeled binder.

Figure 2: U.S. Engineer Office, First Chicago District, Brandon Road Lock and Dam, Showing Lock Construction, August 3, 1931. Available at Brandon Road Lock and Dam, unlabeled binder.

Figure 3: U.S. Engineer Office, First Chicago District, Brandon Road Lock and Dam, Showing Lock Construction, August 17, 1931. Caption on back reads: "View looking north from upper end of lower guide wall, showing lower steel miter gates under construction, south ends of land and river walls. Concrete in walls placed previously by State of Illinois." Available at Brandon Road Lock and Dam, Binder 1 of 5.

Figure 4: Brandon Road Lock, Looking Downstream, 1932. Available at Brandon Road Lock and Dam, unlabeled binder.

Figure 5: Caption on back reads: "Second stage of footing, August 9, 1931." Available at Brandon Road Lock and Dam, Binder 1 of 5.

Figure 6: U.S. Engineers Office, First Chicago District, Brandon Road Lock and Dam, Showing Lock Construction, August 17, 1931. Caption on back reads: "View looking north from downstream cofferdam, showing portion of upper cofferdam, excavation, forms and concrete foundation for Taintor gate dam." Available at Brandon Lock and Dam, Binder 1 of 5.

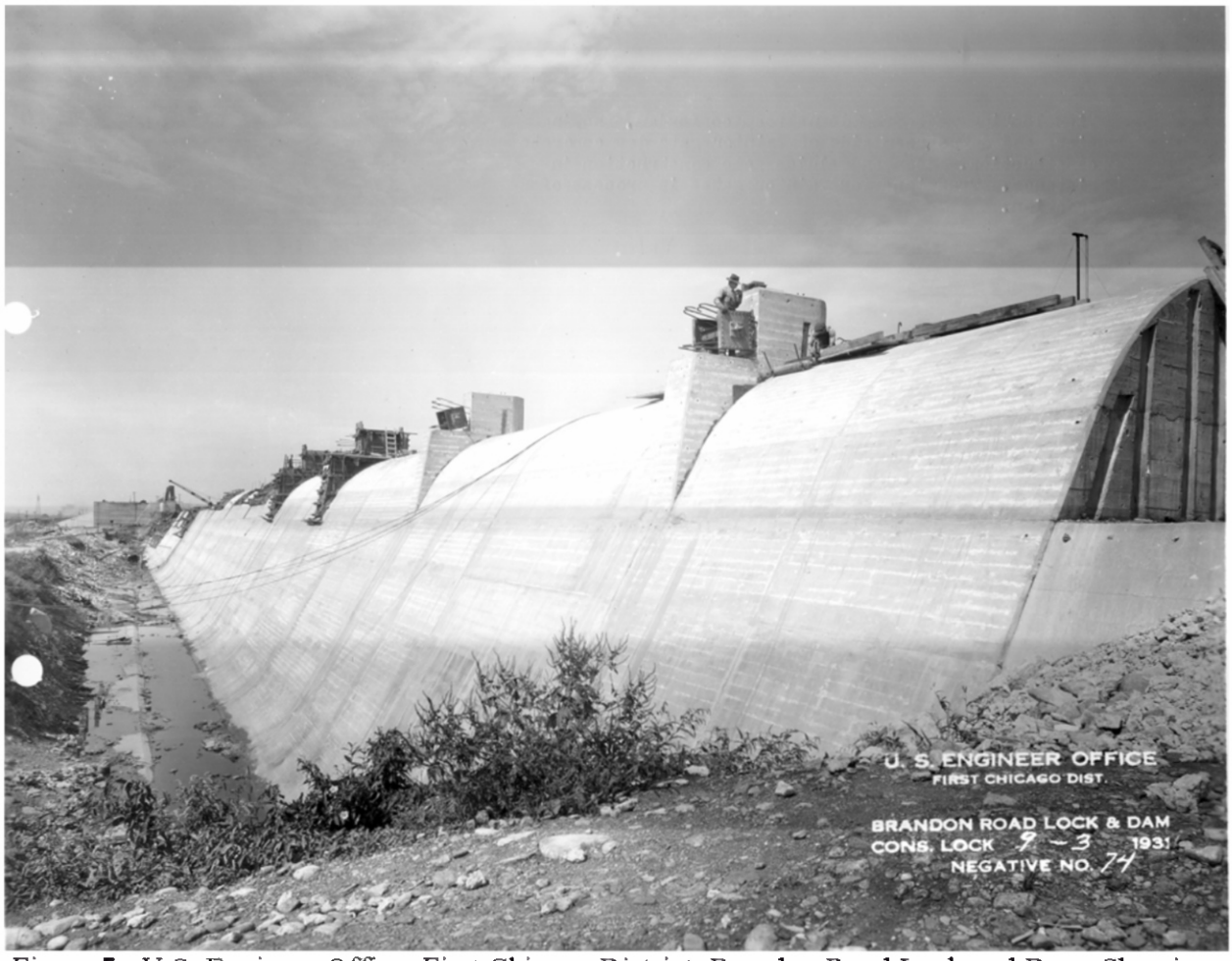

Figure 7: U.S. Engineer Office, First Chicago District, Brandon Road Lock and Dam, Showing Lock Construction, September 3, 1931. Caption on back reads: "View looking west from downstream cofferdam, showing piers and downstream side of Taintor gate dam concrete construction. Head and sluice gate construction in distance. Trunnions for Taintor gates in process of erection." Available at Brandon Road Lock and Dam, Binder 1 of 5.

Figure 8: U.S. Engineer Office, First Chicago District, Brandon Road Lock and Dam, Showing Lock Construction, October 16, 1931. Caption on back reads: "View looking east from west head gate pier, showing lower or downstream side of head gate construction. Men on wall engaged in making sounding in the swift current below head gates to detect scour." Available at Brandon Road Lock and Dam, Binder 1 of 5.

Figure 9: U.S. Engineer Office, First Chicago District, Brandon Road Pool, Joliet, Illinois, June 15, 1932. "E Wall N from Van Buren St Bridge." Caption on back reads: "View looking north from Van Buren St temporary bridge showing pile driver at work driving steel sheet pile cofferdam, partial excavation between Van Buren Street & Cass Street for east wall. Concrete bridge construction for new Cass Street bridge in rear, center & left. Des Plaines River on left." Available at Brandon Road Lock and Dam, unlabeled binder.

Figure 10: U.S. Engineer Office, Chicago District, "Control House, Brandon Road Lock and Dam," May 24, 1935. Available at Brandon Road Lock and Dam, Binder 4 of 5.

Figure 11: Lockkeepers Residences, Brandon Road Lock and Dam, November 17, 1939. Available at Brandon Road Lock and Dam, Binder 4 of 5.